
New Taxa and Combinations in the *Ocotea helicterifolia* (Lauraceae) Species Group

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ABSTRACT. In the course of preparing a treatment of the *Ocotea helicterifolia* group for *Flora Mesoamericana*, the existing treatment was found to be outdated. A review of the group is here presented and includes the description of the following new species: *O. congregata* van der Werff, *O. corrugata* van der Werff, *O. gordonii* van der Werff, and *O. patula* van der Werff, as well as the following new combinations: *O. betazensis* (Mez) van der Werff, *O. bourgeauviana* (Mez) van der Werff, *O. purpurea* (Mez) van der Werff, and *O. tonii* (Lundell) van der Werff. A key to the species of the group is presented, new synonymy is given, and the specimens studied are listed.

Among the species of *Ocotea* in Central America is a group characterized by the presence of an erect indument on the leaves (especially on the lower surface) that is discernible to the touch, with densely to moderately pubescent twigs, tepals that are partially papillose (sometimes only along the margin or near the tip), glabrous or somewhat papillose anthers with the four cells arranged in two superposed pairs and, at least in some species, relatively well-developed staminodia. The term papillose is used here for a dense cover of very short, curly hairs. In a few species the anthers each have a small, sterile tip and the anther cells do not fill the anther completely, as is the case in most species of *Ocotea*. Although this group is easy to recognize, its taxonomy is confused. The presence of well-developed staminodia has resulted in the inclusion of several species in *Phoebe*, and later those were transferred to *Cinnamomum*. Other species have been placed in *Nectandra*, sharing a common papillosity of the tepals and anthers. *Nectandra belizensis* (Lundell) Allen resembles in vegetative characters the *O. helicterifolia* group, but has typical *Nectandra* stamens (short, broad, with the anther cells arranged in a shallow arc, not in two superposed pairs as in *Ocotea*). *Nectandra belizensis* is known from Belize, Costa Rica, and Panama. Rohwer (1991) gave a brief discussion of the group and provided a list of taxa included in it. He also revised the species with the general flower structure

of *O. helicterifolia*, but which did not have the pubescent leaves and twigs. He noted that the *O. helicterifolia* group is related to the *Ocotea sinuata* group, which differs in having tongue-shaped anthers each with a conspicuous sterile tip.

In the course of writing a treatment of *Ocotea* for *Flora Mesoamericana*, I found several undescribed species in the *O. helicterifolia* group and several other species that needed to be transferred to *Ocotea*. A few species of this group occurred outside the area covered by *Flora Mesoamericana*. In addition to the novelties, I decided it might be useful to publish a key to all species I recognize as belonging to the *O. helicterifolia* group, as well as new synonyms. In the most recent treatment of Central American Lauraceae (Allen, 1945), most species of the *O. helicterifolia* group were included in *Phoebe*, and these species were mostly separated based on leaf size and leaf shape. I found these characters less important than Allen did, and rely more on such characters as inflorescence type (racemose or paniculate-cymose), flower characters (flowers glabrous or pubescent; inner surface of tepals glabrous or pubescent; receptacles glabrous or pubescent inside), and leaf position (alternate or clustered). Use of these characters leads to better-defined species, although some of the species appear quite variable and may be further divided at some later point. Specifically, the Costa Rican specimens of *O. helicterifolia* seem slightly different and occur at lower altitudes than specimens collected north of Costa Rica. Likewise, specimens of *O. purpurea* from Panama seem different (fewer lateral veins, for example) than those from Honduras northward. However, splitting these species can only be done using vegetative characters (leaf shape and size), and because I regard these characters as weak and not reliable, I am reluctant to further divide these rather variable species.

In several species the upper rim of the receptacle carries a ring of hairs. These hairs are easily visible and may suggest the receptacle itself is pubescent or the tepals are pubescent on the inner surface. It is necessary to split a receptacle open in order to ascertain whether the receptacle is pu-

bescent inside: a view from above is not sufficient. I only describe tepals as pubescent on the inner surface if the hairs extend at least halfway the

length of the tepals; a tuft of hairs visible at or near the base of the tepals is not enough to score the inner surface of the tepals as pubescent.

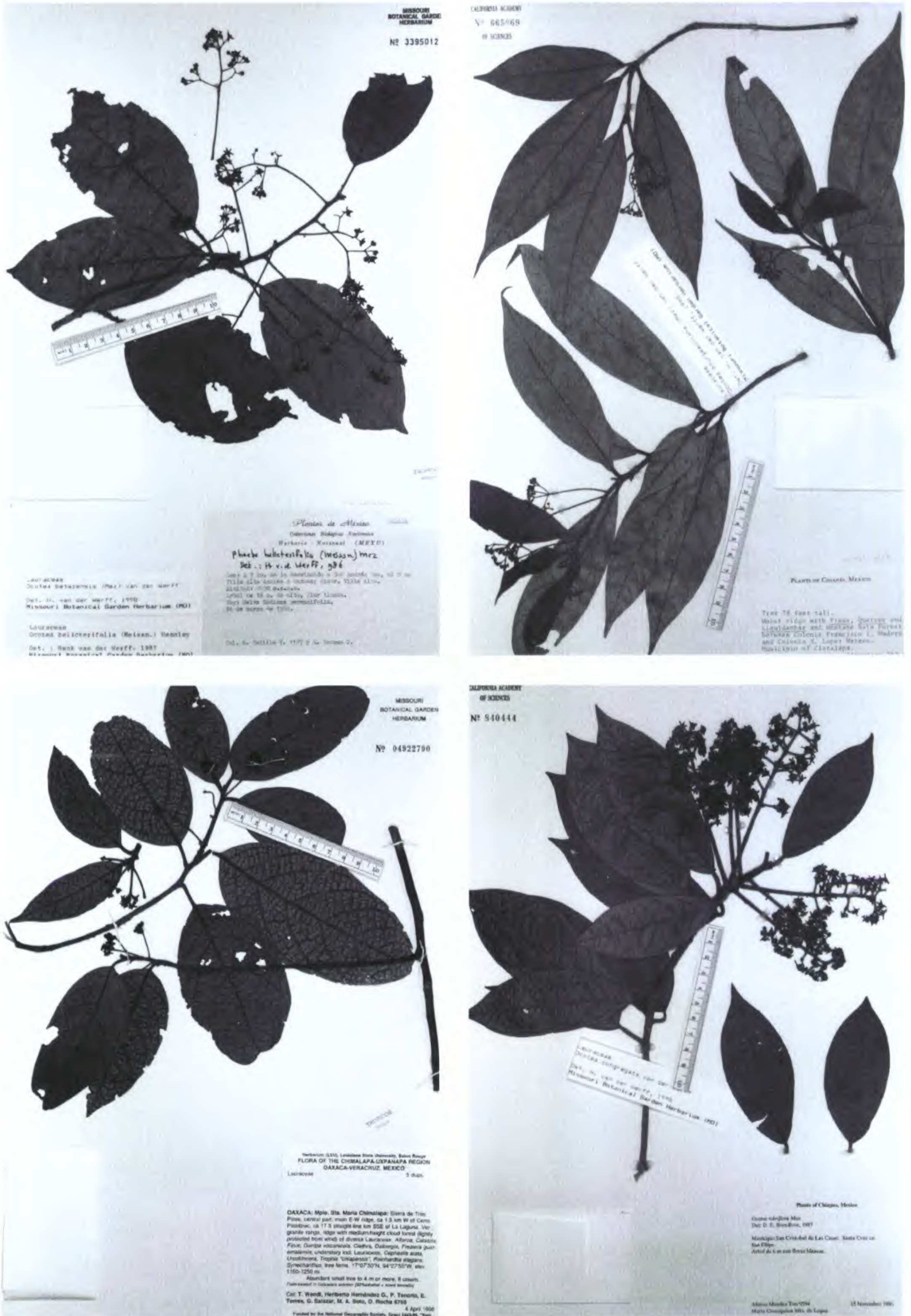
KEY TO SPECIES OF THE *OCOTEA HELICTERIFOLIA* GROUP IN CENTRAL AMERICA

- 1a. Inflorescences racemose or rarely with one or two lateral cymes.
 2a. Leaves obovate; tufts or lines of white hairs common along major veins on lower leaf surface 15. *O.* sp. nov.
 2b. Leaves elliptic; axillary tufts of hairs lacking or only a few on each leaf.
 3a. Leaves bullate-rugose, the major veins strongly impressed on the upper leaf surface 4. *O. corrugata*
 3b. Upper leaf surface smooth or nearly so, the major veins immersed, not strongly impressed.
 4a. Outer surface of tepals glabrous; anthers sessile 5. *O. gordonii*
 4b. Outer surface of tepals at least sparsely pubescent; stamens with filaments 1/3 or more of the length of the anthers.
 5a. Hairs on lower leaf surface ascending, covering most of the lamina; indument gray 8. *O. mollicella*
 5b. Hairs on lower leaf surface erect, most of the lamina visible; indument brown or ferruginous 11. *O. purpurea*
- 1b. Inflorescences paniculate.
 6a. Leaves clustered.
 7a. Outer surface of tepals glabrous 2. *O. bourgeauviana*
 7b. Outer surface of the tepals pubescent.
 8a. Petioles to 6 mm long; leaves 15–25 × 5–6 cm; twigs with yellowish brown indument 12. *O. tonii*
 8b. Petioles at least 10 mm long; leaves 9–17 × 4–7 cm; twigs with brown indument 3. *O. congregata*
- 6b. Leaves alternate, evenly distributed along the twigs.
 9a. Receptacle pubescent inside.
 10a. Leaves elliptic, to 15 cm long 1. *O. betazensis*
 10b. Leaves obovate, 18–40 cm long.
 11a. Indument completely covering young twigs and inflorescences 14. *O. valeroides*
 11b. Surface of twigs and inflorescences visible between the indument 7. *O. lentii*
- 9b. Receptacle glabrous inside.
 12a. Outer surface of tepals pubescent.
 13a. Leaves broadly elliptic; tufts of white hairs lacking in axils of lateral veins or along the major veins 9. *O. patula*
 13b. Leaves obovate; tufts of white hairs present in axils of lateral veins and along the major veins 15. *O.* sp. nov.
 12b. Outer surface of tepals glabrous.
 14a. Inner surface of tepals pubescent; filaments evident, ca. 1/3 the length of the anthers.
 15a. Leaves to 10 cm long, the tips obtuse, acute or shortly acuminate 10. *O. praetermissa*
 15b. Leaves 13–20 cm long, acuminate or gradually narrowed into a slender tip 2. *O. bourgeauviana*
- 14b. Inner surface of tepals glabrous; anthers sessile.
 16a. Surface of young twigs completely covered by the indument; cupule cup-shaped 13. *O. valeriana*
 16b. Surface of young twigs partially visible between the indument; cupule only shallowly bowl-shaped or platelike 6. *O. helicterifolia*

1. *Ocotea betazensis* (Mez) van der Werff, comb. nov. Basionym: *Phoebe betazensis* Mez, Jahrb. Koenigl. Bot. Gart. Berlin 5: 192. 1889. SYNTYPES: Mexico. Oaxaca: *Liebmann 2(C)*, *3(C)*, *22(C)*, *23(C)*, *Galeotti 2885* not seen, *Juergensen 575* not seen. Figure 1.

Oreodaphne mexicana Meisner var. *diminuta* Meisner, Prodr. 15(1): 118. 1864. *Ocotea mexicana* (Meisner) Hemsley var. *diminuta* (Meisner) Hemsley, Biol. Centr. Amer., Bot. 3: 73. 1882. TYPE: *Juergensen 575* not seen.

Ocotea betazensis (as *Phoebe betazensis*) has long been included in *Ocotea helicterifolia*, from which it differs in the elliptic to broadly elliptic (not obovate) leaves, the stamens with well-developed filaments, the dense tomentellous-tomentose indument on the young twigs that completely covers the surface (not hirsute with the surface partially visible), and the generally longer petioles than seen in *O. helicterifolia*. *Ocotea betazensis* is currently only known from cloud forests between 1900 and 2600 m altitude in Oaxaca, but can be expected in neighboring Chiapas.



Figures 1–4 (clockwise from top left). —1. *Ocotea betazensis*: Cedillo 1197. —2. *Ocotea bourgeauwiana*: Breedlove 50583. —3. *Ocotea congregata*: Mendez Ton 9594. —4. *Ocotea corrugata*: Wendt et al. 6765 (isotype).

2. *Ocotea bourgeauviana* (Mez) van der Werff, comb. nov. Basionym: *Phoebe bourgeauviana* Mez, Jahrb. Koenigl. Bot. Gart. Berlin 5: 194. 1889. *Cinnamomum bourgeauvianum* (Mez) Kostermans, Reinwardtia 6: 20. 1961. TYPE: Mexico. Veracruz: Bourgeau 2234 (isotype, MO). Figure 2.

Nectandra longicuspis Lundell, Wrightia 5: 34. 1974. Syn. nov. TYPE: Guatemala. Izabal, Contreras 11186 (isotype, MO).

Phoebe chinantecorum R. E. Schultes, Bot. Mus. Leaflet 9: 170. 1941. Syn. nov. *Cinnamomum chinantecorum* (R. E. Schultes) Kostermans, Reinwardtia 6: 20. 1961. TYPE: Mexico. Oaxaca: Schultes & Reko 827 (holotype, GH).

Ocotea bourgeauviana can be recognized by the combination of paniculate-cymose inflorescences, glabrous flowers, pubescent inner surface of the tepals, and the mostly clustered leaves. The indument on the twigs is hirsute, with the surface of the twigs partially visible between the indument. Leaf size ranges from 13 to 20 cm long. It is known from Mexico (Veracruz, Chiapas), Guatemala, and Honduras at altitudes ranging from 100 to 1200 m, but is infrequently collected. Provisionally placed here are some collections from Veracruz (Mexico) with a glabrous inner surface of the tepals and slightly smaller flowers (4–5 mm diam. vs. 5–6 mm in *O. bourgeauviana*). Because these specimens differ in only one solid character (the glabrous inner surface of the tepals) from *O. bourgeauviana*, I am reluctant to recognize them as a distinct species and list them in the specimens studied as *O. aff. bourgeauviana*.

3. *Ocotea congregata* van der Werff, sp. nov. TYPE: Mexico. Chiapas: Mpio. Oxchuc, Cascada de Coralito, Shilom Ton 8930 (holotype, MO). Figure 3.

Ocotea tonii similis, sed foliis brevioribus, latioribus, petiolis plus quam 10 mm longis, indumento castaneo difert.

Small to medium-sized trees, to 15 m tall. Twigs terete, solid, densely brown-tomentose or tomentelous, the hairs erect and twisted, covering the surface of the young twigs completely, terminal buds densely brown-tomentose. Leaves 9–17 × 4–7 cm, elliptic to broadly elliptic, firmly chartaceous, clustered, the base rounded or obtuse, rarely acute, the apex obtuse to acute, midrib and lateral veins impressed, tertiary venation weakly impressed on the upper surface, midrib and major veins prominently raised, smaller veins raised on the lower surface; upper surface moderately pubescent when young,

the hairs erect, soon becoming glabrous, the pubescence denser and persisting along the major veins, lower surface moderately densely pubescent, the hairs erect and discernible to the touch, the surface readily visible between the hairs, the indument denser and tomentose along the midrib and lateral veins; domatia lacking; petioles 10–25 mm, round, with a similar indument as the twigs. Inflorescences 5–12 cm, paniculate-cymose, the flowers in compact clusters, densely hirsute-tomentose, mostly in the axils of bracts, infrequently in the axils of leaves. Flowers 7–9 mm diam., white, perfect, the receptacle densely pubescent outside; pedicels ca. 3 mm long. Tepals 3 mm long, elliptic, the outside moderately to sparsely pubescent, the inside pubescent near the base, otherwise glabrous, spreading at anthesis, outer 6 stamens 1.6 mm, sessile or nearly so, with a few hairs near the base, otherwise glabrous, the cells arranged in 2 pairs, introrse, at the tip with a narrow, sterile border, inner 3 stamens 1.7 mm, the filament 0.5 mm, with a few hairs, the cells in 2 pairs, extrorse-lateral, glands present at the base of the filaments, staminodia 3, minute, stipitiform, hidden between the hairs on the top of the receptacle; pistil 1.5 mm, glabrous, the style 0.4 mm, receptacle cup-shaped, appressed pubescent or glabrous inside. Fruit ellipsoid, 2 × 1.3 cm, the cupule deeply cup-shaped when young, bowl-shaped at maturity, 1 cm diam., with a single margin, the tepals deciduous. Flowers March, April, November; fruits August, October.

Ocotea congregata is named after the erect stamens grouped in a rather tight cluster. The new taxon is currently only known from the Mexican state of Chiapas and occurs between 800 and 1370 m altitude. It can be recognized by the slightly bulate, loosely clustered leaves, the pubescent flowers arranged in paniculate-cymose inflorescences, the brown to dark brown indument on the twigs, and the rather long (10 mm or more) petioles. Its closest relative is *Ocotea tonii*, which differs in its narrower, longer leaves, shorter petioles (to 6 mm long), and the yellowish brown indument on the young twigs.

Paratypes. MEXICO. **Chiapas:** Mpio. Ocosingo, Breedlove 15672 (CAS), 33017 (CAS, MO), 52589 (CAS, MO), Martinez S. 17084 (MO), Quintanilla 49 (MO); Mpio. San Cristobal de las Casas, Mendez Ton 9594 (CAS, MO); Mpio. Oxchuc, Shilom Ton 8503 (MO).

4. *Ocotea corrugata* van der Werff, sp. nov. TYPE: Mexico. Oaxaca: Mpio. Sta. Maria Chimalapa, Sierra de Tres Picos, alt. 1150–1250 m, T. Wendt, Hernandez G., Tenorio, Torres, Salazar, Soto & Rocha 6765 (holotype, MEXU; isotype, MO). Figure 4.

Ad gregem *Ocoteae helicterifoliae* pertinens, sed foliis corrugatis diversa est.

Small tree, to 4 m. Twigs terete, densely brown-tomentellous, the surface of the young twigs not visible, solid; terminal buds densely tomentellous. Leaves 7–14 × 2.5–7 cm, elliptic or broadly elliptic, firmly chartaceous, alternate, the base variable, from acute or obtuse to rounded, the apex acute or obtuse, the upper surface sparsely pubescent with erect or ascending hairs when young, soon becoming glabrous, the lower surface sparsely pubescent, the hairs erect and discernible to the touch, the indument denser and tomentellous along the major veins, midrib, lateral veins, and tertiary venation impressed on the upper surface, strongly raised on the lower surface, the leaves bullate to rugose, lateral veins 5 to 7, domatia absent, petioles 7–15 mm, flat above, with a similar indument as the twigs. Inflorescences 3–5 cm, racemose, less than 10-flowered, densely hirsute, the flowers grouped near the tip of the inflorescence. Flowers 7–8 mm diam., cream-colored, perfect, receptacle densely pubescent on the outside; pedicels 2–3 mm long. Tepals 3 mm long, elliptic, on both surfaces pubescent near the base, otherwise glabrous, spreading at anthesis; outer 6 stamens 1.5 mm, the filaments ca. 0.4 mm, with some hairs near the base, otherwise glabrous, the cells introrse, arranged in 2 pairs, a sterile tip lacking, inner 3 stamens 1.5 mm long, the filament 0.4 mm long, with 2 glands near the base, the cells in 2 rows, the upper row lateral, the lower one lateral extrorse, staminodia 3, clavate, with a few hairs, difficult to see among the hairs on the rim of the receptacle, pistil glabrous, ca. 1 mm long, the style very short, receptacle cup-shaped, appressed pubescent inside. Fruit and cupule unknown. Flowers April.

Although *Ocotea corrugata* is only known from the type collection, it is here described largely because of its very distinct, bullate to rugose leaves; additional characters are the racemose inflorescences and the pubescent inside of the receptacle. It belongs to the *Ocotea helicterifolia* group, where it does not seem to have a close relative. Racemose inflorescences are uncommon in this complex, but I do not think that *O. corrugata* is closely related to the other species with racemose inflorescences such as *O. purpurea* and *O. gordonii*. These species differ greatly from each other in other characters, and racemose inflorescences have probably arisen several times in this complex by reduction of the more common paniculate-cymose inflorescence. This species was described as abundant at the type

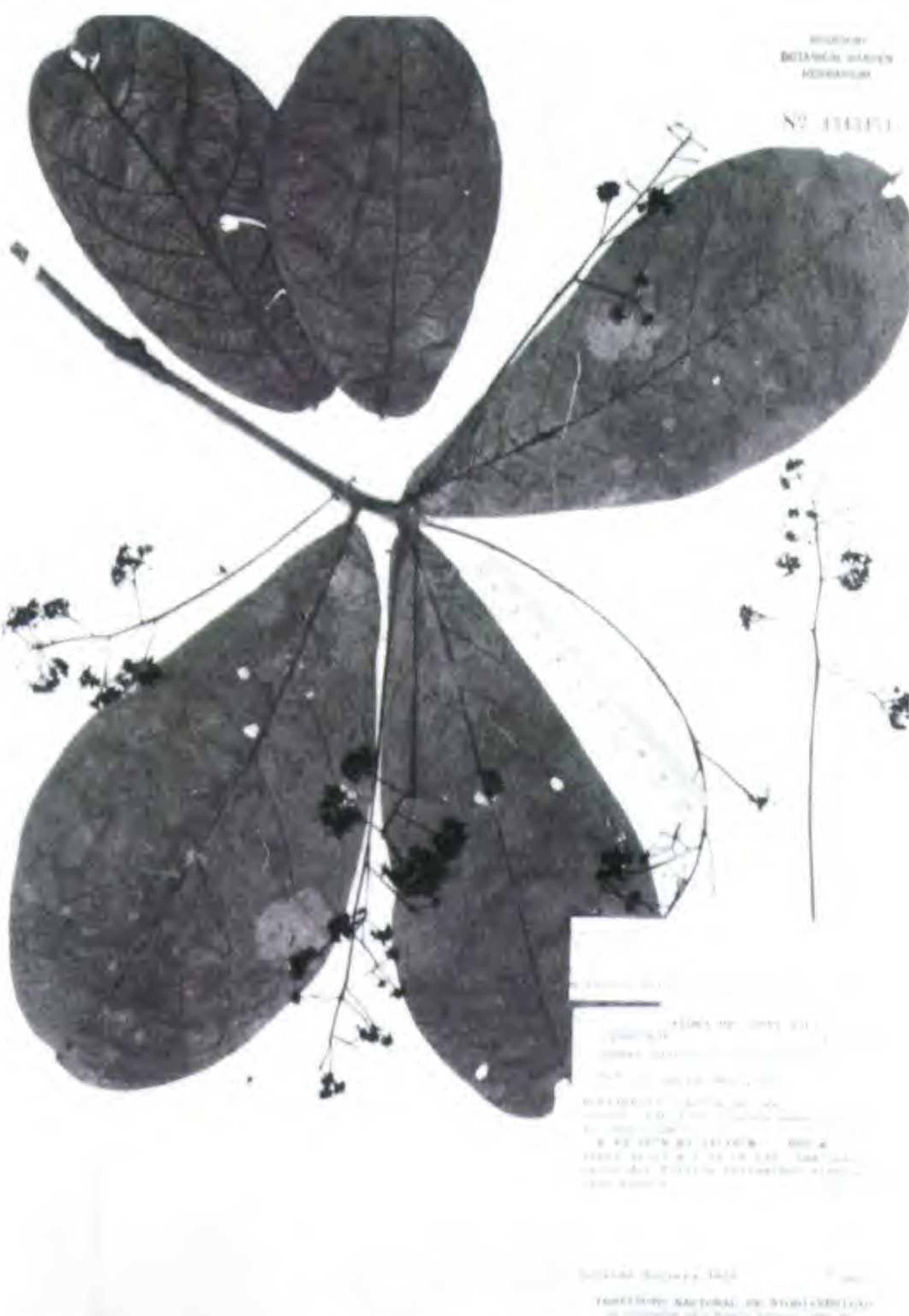
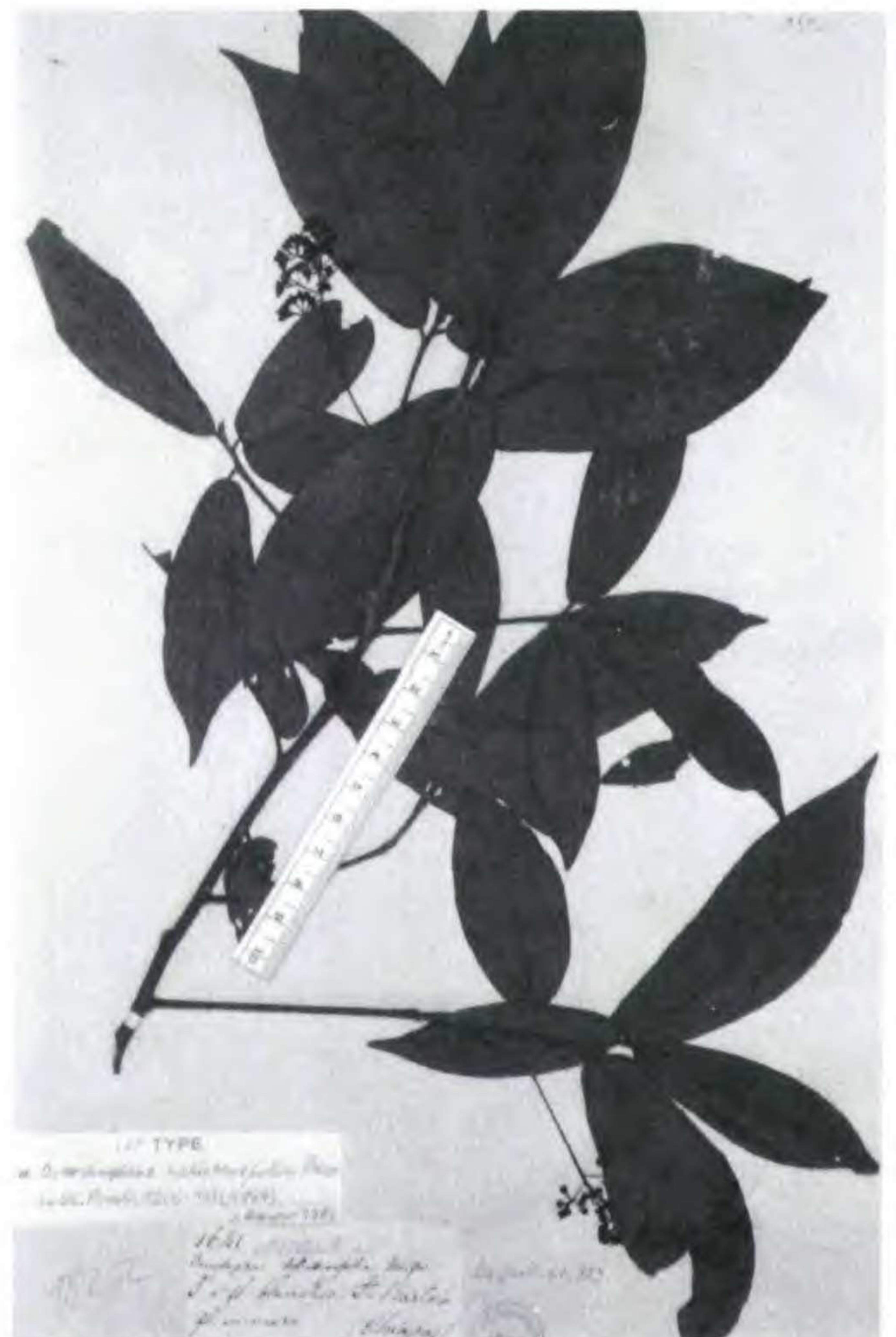
locality. However, the remoteness of this locality made it difficult to bring back more material.

5. *Ocotea gordonii* van der Werff, sp. nov. TYPE: Panama. Chiriquí: vicinity of Fortuna Dam, G. McPherson 10421 (holotype, MO). Figure 5.

Inter speciebus *Ocoteae helicterifoliae* gregis inflorescentia racemosa, receptaculo intus pubescente et pedicellis longis recedit.

Small trees, to 10 m tall. Twigs terete, solid, densely tomentose, the surface not or scarcely visible between the hairs; terminal buds densely tomentose. Leaves 12–22 × 5–8 cm, narrowly to broadly elliptic, chartaceous, alternate and evenly distributed along the twigs, the margin flat or sometimes folded downward, the base acute or obtuse to almost rounded, the tip acuminate with an acumen to 2 cm long or acute, the upper surface with some erect, curled hairs when young, but this indument rapidly wearing off, the hairs denser and becoming tomentose along the major veins, the lower surface copiously pubescent, the hairs erect and soft to the touch, denser and tomentose along the midrib and lateral veins, midrib and lateral veins somewhat impressed, tertiary venation slightly raised on the upper surface, midrib, lateral veins, and tertiary venation raised or prominently raised on the lower surface; lateral veins 6 to 8; domatia absent; petioles 8–14 mm, flattened on the upper side, with a similar indument as the twigs. Inflorescences 8–16 cm, racemose, moderately densely to sparsely pubescent, the hairs erect or spreading, to 0.6 mm long; in axils of bracts or, less frequently, of normal leaves. Flowers 8–10 mm diam., white, glabrous, fragrant, perfect, pedicels ca. 1 cm long. Tepals 6, 4–4.5 mm long, elliptic, spreading at anthesis, the outer 3 with a basal triangular papillose patch, otherwise glabrous, the inner 3 uniformly papillose on the inner surface; stamens 9, 4-celled, the outer 6 weakly papillose, the cells arranged in 2 rows, opening introrse-lateral, the anthers sessile or nearly so, sterile tip short, 0.2–0.3 mm, inner 3 stamens 1.5 mm long, the anther sessile, the cells arranged in 2 rows, laterally extrorse, the anthers weakly papillose and with a few hairs near the base, glands present at the base of the inner 3 stamens, staminodia not seen, receptacle cup-shaped, pubescent inside. Fruits and cupules not known. Flowers February–April.

Ocotea gordonii is part of the *Ocotea helicterifolia* complex because of the papillose inner surface of the tepals, the relatively large flowers, the long spreading indument of stems and leaves, and the spreading tepals. Within this group it stands



Figures 5–8 (clockwise from top left). —5. *Ocotea gordonii*: McPherson 10421 (holotype). —6. *Ocotea helicterifolia*: Linden 1641 (syntype). —7. *Ocotea helicterifolia*: Mendez Ton 5902. —8. *Ocotea helicterifolia* (Costa Rica): Herrera 4866.

apart due to its racemose inflorescences, the long pedicels, and pubescent receptacle. Only one other species in this group with racemose inflorescences is known from Panama, and this species, *O. purpurea*, has pubescent flowers ca. 5 mm in diameter and leaves less than 11 cm long. Vegetatively, there is a stronger resemblance between the new species and *O. valeriana* and *O. helicterifolia*, both of which occur in Costa Rica. These two species have paniculate-cymose inflorescences and glabrous receptacles. Two other species from Costa Rica and Panama, *O. lentii* and *O. valeroides*, have pubescent receptacles like *O. gordonii*, but differ in their paniculate-cymose inflorescences and obovate leaves.

This species is dedicated to Gordon McPherson, whose excellent collections have contributed much to our knowledge of the Panamanian flora.

Paratypes. PANAMA. **Veraguas:** mountains above Sta. Fe, *Hammel & Kress 8534* (MO). **Chiriquí:** vicinity of Fortuna Dam, *McPherson 10573* (MO).

6. *Ocotea helicterifolia* (Meisner) Hemsley, Biol. Centr. Amer., Bot. 3: 73. 1882. *Oreodaphne helicterifolia* Meisner, Prodr. 15(1): 123. 1864. *Phoebe helicterifolia* (Meisner) Mez, Jahrb. Koenigl. Bot. Gart. Berlin 5: 193. 1889. *Cinnamomum helicterifolium* (Meisner) Kostermans, Reinwardtia 6: 21. 1961. TYPE: Mexico. Chiapas: *Linden 1641* (syntype, K). Figures 6, 7, 8.

Nectandra corzoana Lundell, Wrightia 4: 102. 1969. Syn. nov. *Phoebe corzoana* (Lundell) Lundell, Wrightia 5: 342. 1977. *Cinnamomum corzoanum* (Lundell) Kostermans, Reinwardtia 10: 422. 1988. TYPE: Mexico. Chiapas: *Shilom Ton 3560* (holotype, LL).

Ocotea tenejapensis Lundell, Wrightia 4: 108. 1969. Syn. nov. TYPE: *Shilom Ton 779* (holotype, LL).

Phoebe nectandroides Mez, Jahrb. Koenigl. Bot. Gart. Berlin 5: 194. 1889. SYNTYPES: *Botteri 1018* not seen, *Galeotti 7004* (BR), *Juergensen 937* not seen, *Liebmann 4* not seen, *Oersted 21* not seen.

Phoebe obtusata Lundell, Contr. Univ. Mich. Herb. 6: 21. 1941. Syn. nov. *Cinnamomum obtusatum* (Lundell) Kostermans, Reinwardtia 6: 22. 1961. TYPE: Mexico. Chiapas: *Matuda 1887* (isotype, CAS).

Ocotea helicterifolia is characterized by its alternate leaves, glabrous flowers and inside of the receptacle, as well as the hirsute indument of the twigs, with at least a small part of the surface visible between the hairs. In Costa Rica it can be confused with *O. valeriana*, which has a denser indument on twigs and inflorescences. *Ocotea helicterifolia* occurs from southern Mexico to Panama at altitudes of 1000–1900 m; in Costa Rica it occurs

at lower elevations (50–600 m) and has more obovate leaves. These collections from Costa Rica possibly represent an undescribed taxon. Provisionally included in *O. helicterifolia* is *Ocotea tenejapensis*, known only from the type collection. This collection differs from typical *O. helicterifolia* in that the outer 6 stamens have filaments about 1/3 the length of the anthers, the lower leaf surface is very sparsely pubescent, and small axillary tufts of hairs are often present on the lower leaf surface. I have not found other collections with these characters, and therefore include *O. tenejapensis* as a somewhat aberrant form in *O. helicterifolia*.

Because *O. helicterifolia* has a wide range of distribution and shows some variation in vegetative characters, I include three figures, including one of the type, of this species.

7. *Ocotea lentii* W. C. Burger, Fieldiana Bot., n.s. 23: 86. 1990. TYPE: Costa Rica. Cartago: *Lent 794* (isotype, MO). Figure 9.

Ocotea lentii is best recognized by its large (18–40 cm long), obovate, alternate leaves and the hirsute indument on twigs and inflorescences. Part of the surface remains visible between the hairs. *Ocotea lentii* is an infrequently collected species known only from the provinces Cartago and Guanacaste in Costa Rica. Most collections have been made between 700 and 1400 m altitude.

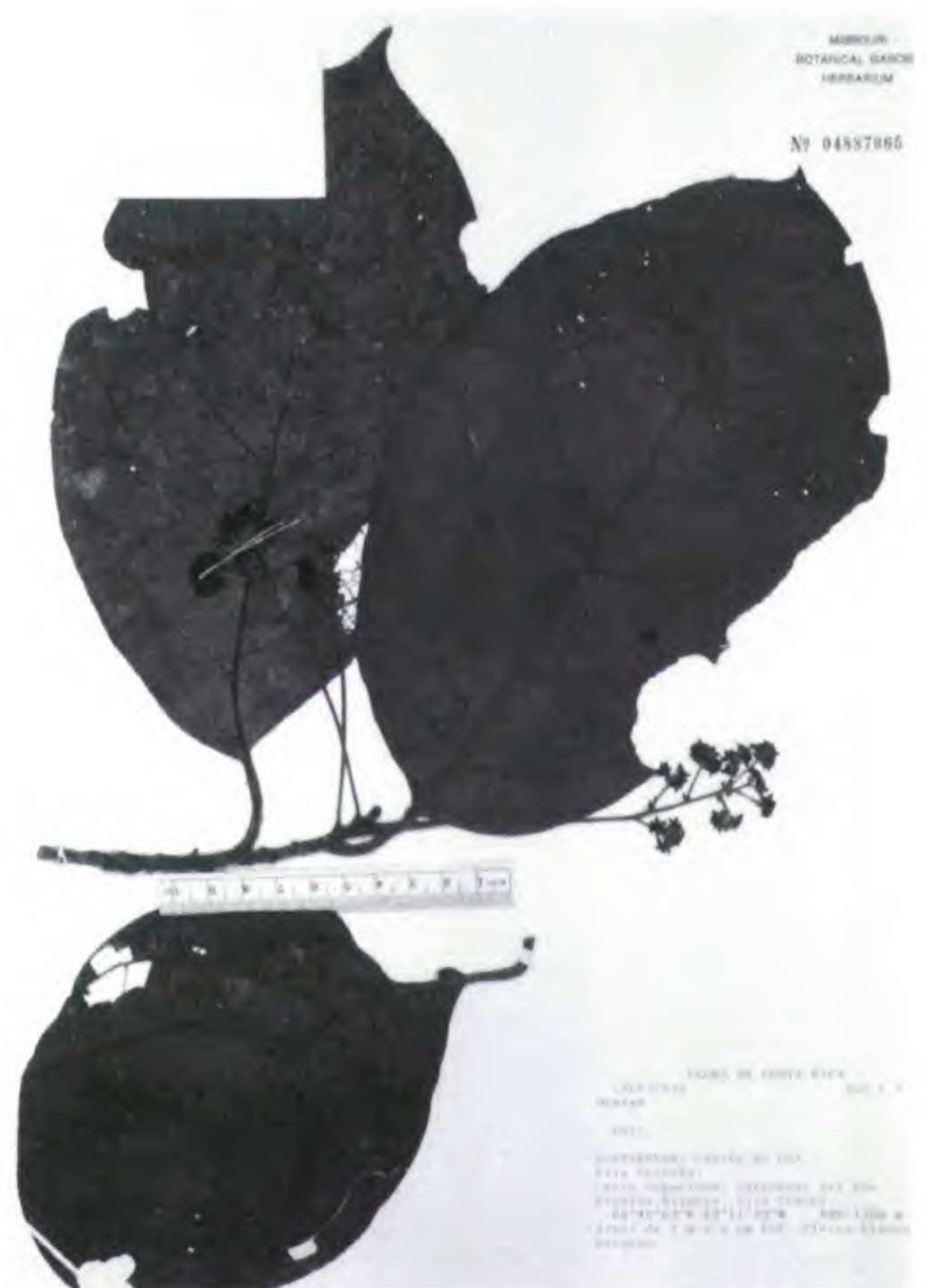
8. *Ocotea mollicella* (Blake) van der Werff, Fieldiana Bot., n.s. 23: 88. 1990. *Phoebe mollicella* Blake, Contr. Gray Herb. 52: 64. 1917. *Cinnamomum mollicellum* (Blake) Kostermans, Reinwardtia 6: 22. 1961. TYPE: Costa Rica. *Tonduz 11676* (isotype, G). Figure 10.

Ocotea mollicella is characterized by its racemose inflorescences, ascending (not erect) hairs on the lower leaf surface, and the gray color of the indument. Its leaves are narrowly elliptic to elliptic-lanceolate and generally less than 8 cm long. *Ocotea mollicella* is a rarely collected species only known from cloud forests in Costa Rica and occurring between 1400 and 2300 m altitude.

9. *Ocotea patula* van der Werff, sp. nov. TYPE: Costa Rica. Puntarenas: Canton de Osa, Fila Costena, *Aguilar et al. 2715* (holotype, MO). Figure 11.

Ocoteae valerianae similis, sed floribus pubescentibus pedicellis tomentellis brevioribusque recedit.

Small trees, to 8 m. Twigs terete or slightly ridged, solid, densely yellowish brown tomentose



Figures 9–12 (clockwise from top left). —9. *Ocotea lentii*: Herrera 8938. —10. *Ocotea mollicella*: Tonduz 11676 (isotype). —11. *Ocotea patula*: Aguilar 2715 (holotype). —12. *Ocotea praetermissa*: Burger et al. 12065 (holotype).

when young, the surface completely covered by the indument, the indument becoming whitish with age, terminal buds densely yellowish brown tomentose. Leaves 12–24 × 9–14 cm, broadly elliptic, chartaceous, alternate, the base obtuse to rounded, the apex obtuse or shortly acuminate, the upper surface with some erect hairs when young, soon glabrescent, the midrib and lateral veins tomentellous, the lower surface sparsely to moderately pubescent, the hairs erect, the indument denser and tomentellous along the midrib and lateral veins, midrib, lateral veins, and tertiary venation immersed on the upper surface, raised to prominently raised on the lower surface, domatia lacking, lateral veins 7–8; petioles 17–26 mm long, with a similar indument as the twigs, shallowly canaliculate on the upper surface. Inflorescences 10–16 cm long, paniculate-cymose, densely yellowish brown tomentellous, in the axils of cataphylls, rarely in the axils of leaves. Flowers ca. 7 mm diam., white, perfect, sparsely to moderately pubescent; receptacle densely pubescent outside; pedicels ca. 2 mm long, tomentellous. Tepals ca. 2.5 mm long, elliptic, spreading or somewhat reflexed at anthesis, the inner surface moderately to sparsely papillose; stamens 9, 4-celled, the outer 6 ca. 1.2 mm long, weakly papillose, the cells arranged in 2 pairs, introrse, a short (0.2 mm) sterile tip present, the anthers sessile or nearly so, inner 3 stamens as long as the outer 6, also weakly papillose, sessile or nearly so, the cells in 2 pairs, extrorse, glands present at the base, staminodia not seen. Pistil ca. 1.5 mm long, the style as long as the ovary, glabrous, receptacle cup-shaped, glabrous inside. Fruits not known. Flowers December.

Ocotea patula is named after the spreading tepals at anthesis. It is known only from two collections made on the same day in the same general area, but probably from different trees. One of the collectors indicated it was growing on a limestone substrate. It is part of the *O. helicterifolia* group and resembles *O. valeriana*. However, it differs from this species in its densely tomentellous inflorescences (with the surface entirely or almost entirely covered by the indument), by its shorter (2–3 mm vs. 6–8 mm) and tomentellous pedicels, as well as its pubescent flowers.

Paratype. COSTA RICA. **Puntarenas:** Fila Costena, Hammel *et al.* 19217 (MO).

10. *Ocotea praetermissa* van der Werff, Novon 6: 482. 1996. TYPE: Costa Rica. Cartago: Burger *et al.* 12065 (holotype, MO). Figure 12.

Ocotea praetermissa can be recognized by its al-

ternate, rather small leaves (rarely exceeding 10 cm), paniculate inflorescences, glabrous flowers with a pubescent inner surface of the tepals, and a glabrous receptacle. It is a species of montane forests from 2000–3200 m elevation, mostly found in Costa Rica, but with a few collections from Panama. This species has been misidentified as *Ocotea* (or *Phoebe*) *pittieri* and was included in Burger and van der Werff (1990) under that name.

11. *Ocotea purpurea* (Mez) van der Werff, comb. nov. Basionym: *Phoebe purpurea* Mez, Jahrb. Koenigl. Bot. Gart. Berlin 5: 196. 1889. TYPE: Guatemala. Alta Verapaz, *von Tuerkheim* 371 not seen (B not seen, type photograph, MO). Figure 13.

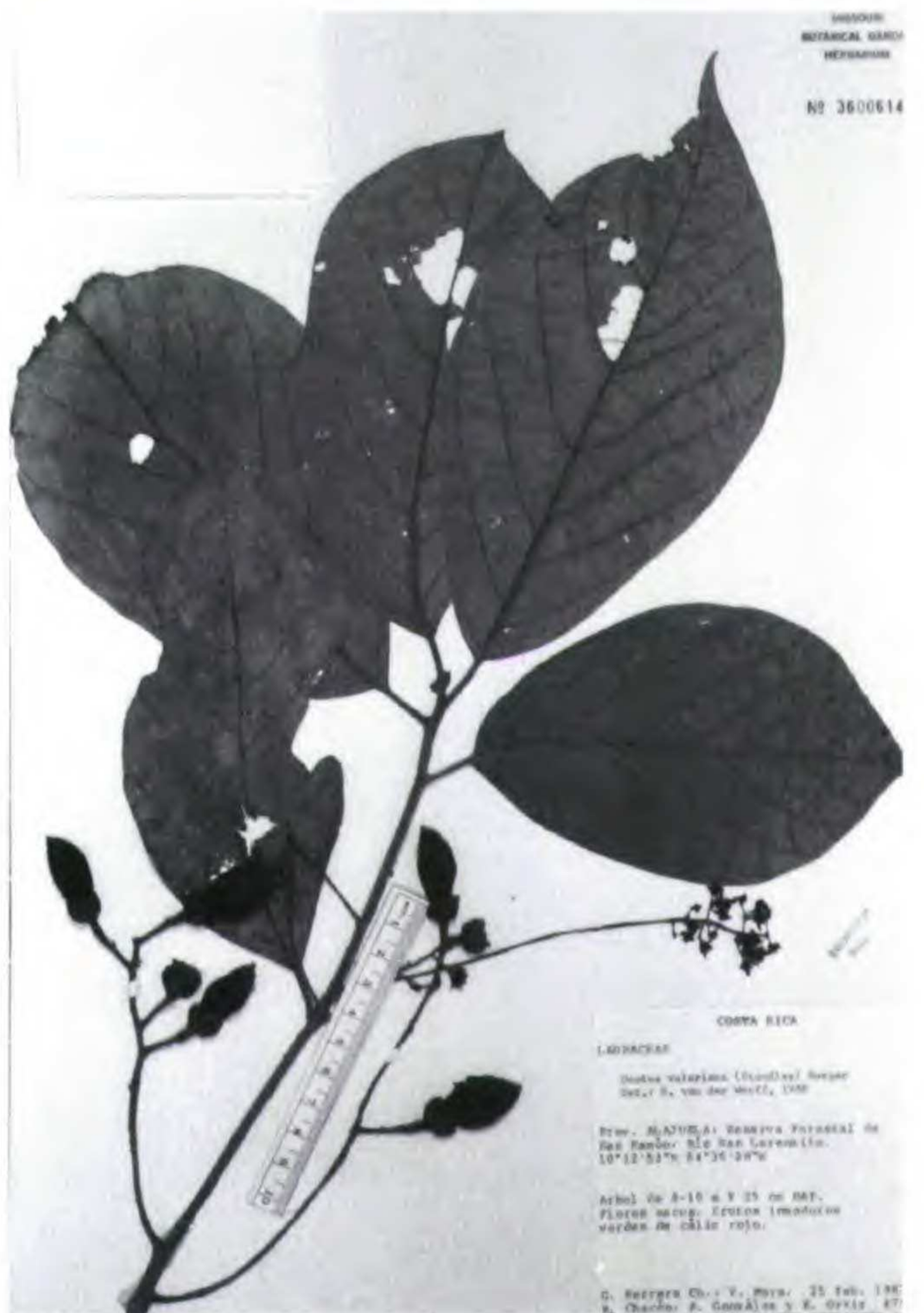
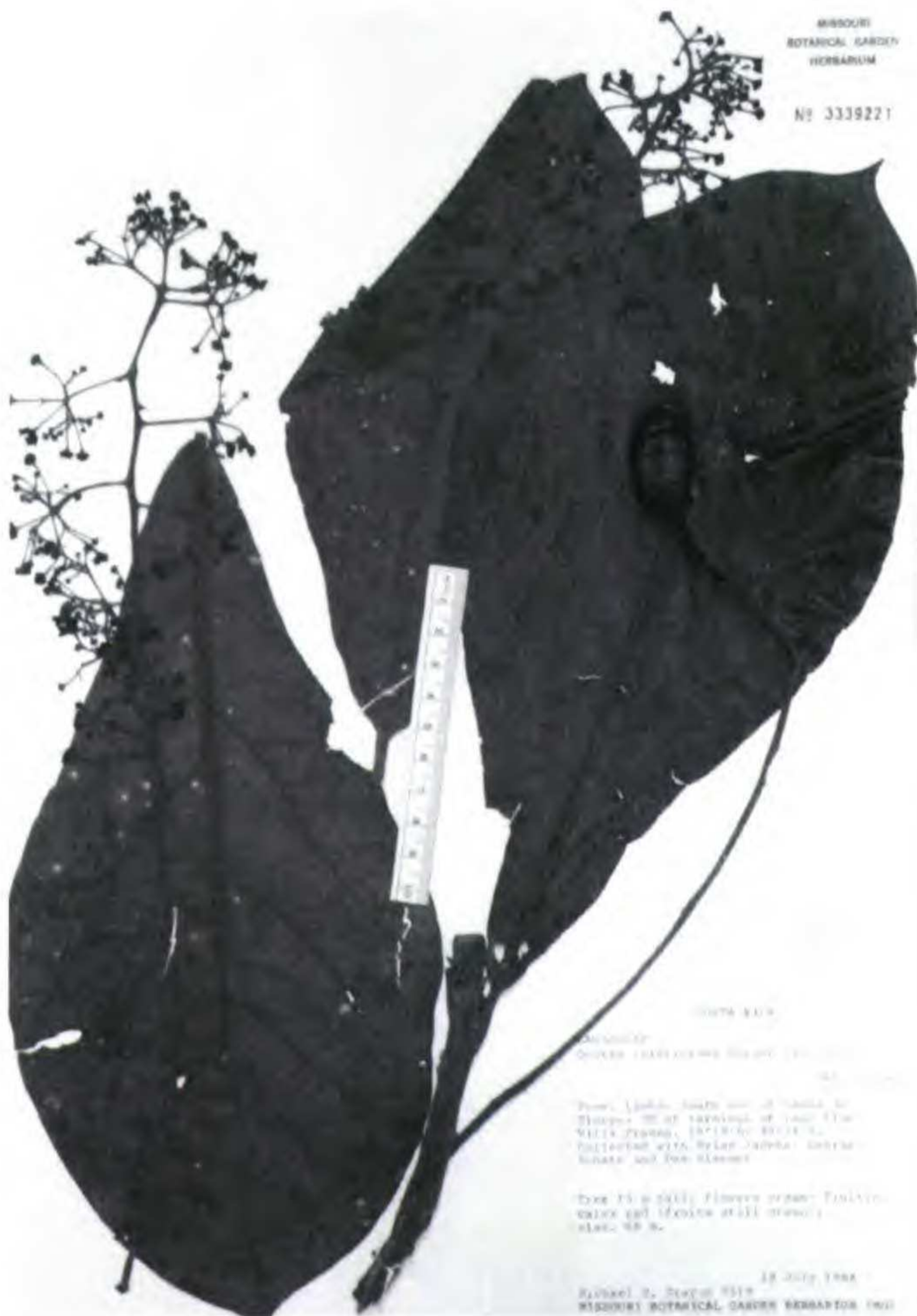
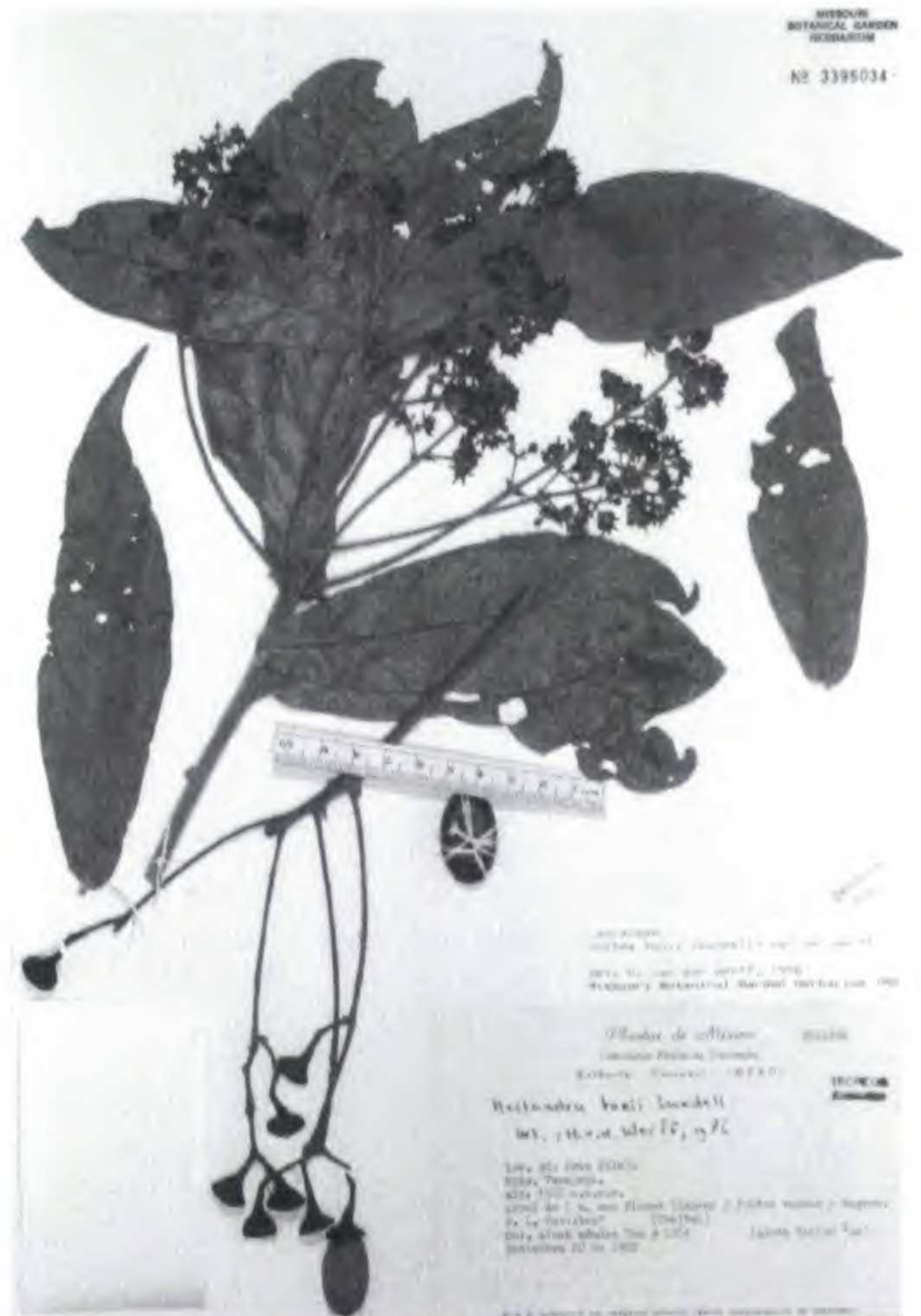
Nectandra capituliforma Lundell, Wrightia 5: 33. 1974. Syn. nov. TYPE: Guatemala. Contreras 11235 (isotype, MO).

Ocotea purpurea is characterized by its racemose inflorescences (one or two cymes are rarely present at the base of the inflorescence), pubescent flowers, and rather small (to 11 cm), (narrowly) elliptic, flat leaves. The leaf and inflorescence characters are clearly visible on the type photograph. It is among the few species in the *O. helicterifolia* complex with racemose inflorescences and pubescent flowers; the other ones are an undescribed species from Mexico with large, obovate leaves and conspicuous domatia along the major veins, *O. corrugata* with bullate or rugose leaves, and *O. mollicella* with ascending, gray pubescence on the lower leaf surface (brown and erect in *O. purpurea*). *Ocotea purpurea* occurs in southern Mexico, Guatemala, Honduras, and Panama at altitudes ranging from 1400 to 2600 m. The name *Phoebe bourgeauviana* has frequently been applied to this species, but the type of *P. bourgeauviana* has glabrous flowers and a paniculate-cymose inflorescence.

12. *Ocotea tonii* (Lundell) van der Werff, comb. nov. Basionym: *Nectandra tonii* Lundell, Wrightia 4: 106. 1969. TYPE: Mexico. Chiapas: Municipio de Tenejapa, A. Shilom Ton 2014 (isotype, NY). Figure 14.

Ocotea tonii is characterized by its narrowly elliptic, clustered leaves with short petioles, yellowish brown tomentum on the young twigs, and paniculate-cymose inflorescences with pubescent flowers. It is only known from Chiapas at altitudes between 800 and 1500 m.

13. *Ocotea valeriana* (Standley) W. C. Burger, Fieldiana Bot., n.s. 23: 96. 1990. *Phoebe val-*



Figures 13–16 (clockwise from top left). —13. *Ocotea purpurea*: Breedlove 9467. —14. *Ocotea tonii*: Mendez Ton 5264. —15. *Ocotea valeriana*: Herrera et al. 475. —16. *Ocotea valerioides*: Grayum 3519.

eriana Standley, Publ. Field Mus. Nat. Hist., Bot. Ser. 18(2): 460. 1937. *Cinnamomum valerianum* (Standley) Kostermans, Reinwardtia 6: 24. 1961. TYPE: Costa Rica. El Copey, *Tonduz 11746* (holotype, F not seen). Figure 15.

Nectandra austinii Allen, J. Arnold Arbor. 26: 374. 1945. Syn. nov. TYPE: Costa Rica. *Austin Smith P2226* (holotype, A not seen).

Phoebe smithii Allen, J. Arnold Arbor. 26: 317. 1945. *Cinnamomum smithianum* Kostermans, Reinwardtia 6: 23. 1961. TYPE: Costa Rica. *Austin Smith P.C. 367* (holotype, F not seen).

Ocotea valeriana resembles *O. helicterifolia* in its paniculate-cymose inflorescences, alternate leaves, glabrous flowers, and glabrous inside of the receptacles. They are best separated by the type of indument on the young twigs. In *O. valeriana* this indument consists of short, matted hairs and longer, erect hairs; usually the short, matted hairs cover the surface of the twigs completely. The indument of *O. helicterifolia* consists only of long, erect hairs, which may be densely distributed, but do not cover the surface of the twigs completely. The cupules of *O. valeriana* are also deeper than those of *O. helicterifolia*. *Ocotea valeriana* is not rare in Costa Rica and is known from a very few collections in Panama. It occurs from 800 to 2200 m. I accept the concept of *O. valeriana* used in Burger and van der Werff (1990), where W. C. Burger, who had access to the holotype, transferred *Phoebe valeriana* to *Ocotea*. Although I have not seen the types of *Nectandra austinii* and *Phoebe smithii*, I place both species in synonymy of *O. valeriana* based on the paratypes of these species I have seen (for *N. austinii*: *Austin Smith P2114* (GH); for *P. smithii*: *Austin Smith H523* (MO)).

14. *Ocotea valeroides* W. C. Burger, Fieldiana Bot., n.s. 23: 97. 1990. TYPE: Costa Rica. *Hartshorn 1530* (isotype, MO). Figure 16.

This species is similar to *O. lentii* in its large, obovate leaves, paniculate-cymose inflorescences, and pubescent inside of the receptacles. *Ocotea valeroides* differs in its denser indument, completely covering the surface, on the twigs and inflorescences. It is known from a few collections in Costa Rica and Panama, where it occurs in lowland rainforest between 50 and 500 m altitude.

15. *Ocotea* sp. nov.

This species can be readily recognized by its obovate leaves with conspicuous tufts of whitish hairs in the axils of the lateral veins and along the major

veins. Its inflorescences are racemose or have secondary axes terminating in a cyme. Flowers are pubescent. A description of this species is being prepared by F. Lorea-Hernandez. The new species is only known from the state of Guerrero, Mexico.

IMPERFECTLY KNOWN SPECIES

Ocotea macrophylla Kunth, Nov. Gen. Sp. 2: 131. 1818. *Nectandra macrophylla* (Kunth) Nees, Systema Laurinarum 292. 1836. TYPE: Colombia. Quindiu, *Bonpland s.n.* (isotype, P).

The type of *O. macrophylla* is a fruiting specimen; thus, flowering specimens can only be associated with this name based on vegetative similarities. Rohwer (1991) recognized several recent collections from Colombia as *O. macrophylla* and accepted *O. macrophylla* as the only species in the *O. helicterifolia* group occurring south of Panama. However, recent collections show that probably more than one species is present in northern South America; lack of sufficient flowering collections makes it impossible to accurately describe the taxa involved. All collections have alternate leaves and paniculate-cymose inflorescences.

Provisionally I distinguish the following entities:

1. *Ocotea macrophylla* sensu typi. The type collection has a rather lax, hirsute indument on the twigs, which does not completely cover the surface. The hairs on the lower leaf surface are also rather long and straight. The inflorescence or infructescence is sparsely hirsute. In addition to the type, I place here *Sanchez 1371* (MO) from Antioquia, Colombia, and *Ruiz Teran 1558* (MO), *Breteler 4928* (MO), both from Mérida, Venezuela. The Ruiz Teran specimen is a fruiting one, while the Sanchez and Breteler collections have flowers. These flowers are glabrous, even on the inside of the tepals. Anthers of the outer six stamens are sessile or nearly so.

2. *Sanchez 1891* (MO) from Antioquia, Colombia. Indument on the twigs is densely tomentellous/tomentose, covering the surface completely, as is the indument on the inflorescences. The flowers are pubescent.

3. A group of several specimens characterized by a dense, tomentellous indument on the twigs, covering the surface completely. Inflorescences are sparsely pubescent, and the flowers are glabrous or nearly so. This group occurs in Colombia (Boyaca: *Lawrance 217 & 281* (MO); Antioquia: *Fernandez 7* (MO) and *Giraldo 287* (MO); Valle: *Croat 70677* (MO) and *Albert 2451* (MO)) and Ecuador (Carchi: *Palacios 12794* (MO), and *van der Werff 10772* (MO)).

OCOTEA SPECIES, POSSIBLY UNDESCRIBED

A few collections from Puebla (Mexico) resemble *Ocotea helicterifolia* vegetatively, but differ in having rather small flowers (only 5–6 mm diam.) and in having stamens with distinct filaments (filaments 1/3 as long as the anthers). I have not seen fruiting material of this taxon. These collections (*Rzedowski 31863*, *Tenorio 8686*, *Ventura 783*, and *Campos 225*, all in MO) may well represent an undescribed species, but I prefer to wait until more collections are at hand before describing it.

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 Rohwer, J. G. 1991. Borderline cases between *Ocotea*, *Nectandra*, and *Phoebe* (Lauraceae): The marginal species of the *O. helicterifolia* group, including the *O. heydeana* group. *Bot. Jahrb. Syst.* 112(3): 365–397.

LIST OF SPECIES RECOGNIZED

1. *Ocotea betazensis* (Mez) van der Werff
2. *Ocotea bourgeaui* (Mez) van der Werff
3. *Ocotea congregata* van der Werff
4. *Ocotea corrugata* van der Werff
5. *Ocotea gordonii* van der Werff
6. *Ocotea helicterifolia* (Meisner) Hemsley
7. *Ocotea lentii* W. C. Burger
8. *Ocotea mollicella* (Blake) van der Werff
9. *Ocotea patula* van der Werff
10. *Ocotea praetermissa* van der Werff
11. *Ocotea purpurea* (Mez) van der Werff
12. *Ocotea tonii* (Lundell) van der Werff
13. *Ocotea valeriana* (Standley) W. C. Burger
14. *Ocotea valeroides* W. C. Burger

SPECIMENS STUDIED

If collected by a team, only the last name of the first collector is listed. For example, Breedlove & Smith is included as Breedlove. Type collections are in bold face. The number in parentheses following the collector refers to the species listed above, for example, Aguilar 438 is species # 6 from the list (= *O. helicterifolia*).

Aguilar 438 (6), **2715** (9), 2819 (6); Allen 15209 (6); Almeda 3762 (10); Angulo 200 (10); Antonio 1602 (10); Aranda 1247 (11), 1261 (11), 1265 (11), 1317 (11); Austin Smith H523 (13), H679 (10), **P2114** (13).

Beaman 5402 (2); Bello 640 (13), 1977 (13), 4316 (13), 4340 (13); **Bourgeau 2234** (2); Brant 2871 (2), 2886 (11); Breedlove 6307 (12), 6969 (11), 9467 (11), 15672 (3), 21696 (6), 23329 (6), 24742 (6), 25130 (6), 27588 (6), 27637 (11), 28182 (11), 31020 (6), 31371 (6), 32107 (6), 32239 (6), 32668 (6), 32699 (6), 33017 (3), 33543 (11), 34800 (6), 35276 (6), 38043 (2), 38781 (6), 42794 (11), 44395 (6), 44411 (6), 47853 (6), 48210 (6), 49332 (6), 49348 (6), 49371 (6), 49746 (6), 50583 (2), 51313 (6), 52589 (3), 52683 (6), 52998 (6), 53010 (6), 55689 (6), 55690 (6), 57479 (6), 58528 (6), 60245 (6), 60289 (6), 66260 (6), 68637 (6), 68935 (11), 70059 (12), 72693 (11); Burger 11747 (6), **12065** (10), 12097 (13).

Cascante 644 (13); Chavarria 1153 (13); Campos 853 (6), 954 (6), 1020 (6), 1328 (6), 1877 (6), 2569 (6), 3012 (6), 3175 (6); Cedillo 667 (1), 1197 (1), 1204 (1), 1257 (1), 3060 (aff. 2), 3323 (aff. 2), 3406 (aff. 2); Chacon 1557 (13), 1634 (14); Choc 89 (6); Churchill 4326 (6), 5926 (6); Contreras 5209 (11), 11186 (2), 11205 (2), 11233 (11), **11235** (11), 11318 (11); Croat 46913 (13), 47613 (6), 64215 (6).

Davidse 28547 (10), 28551 (10), 28627 (10), 28809 (10), 28922 (10), 30477 (6), 34826 (11); Dryer 1336 (13).

Estrada 515 (14); Evans 1474 (11).

Galeotti 7004 (6); Gentry 13575 (6), 44065 (6); Gereau 2096 (1); Gomez 18814 (7), 23619 (14); Gonzalez 159 (14); Grayum 3519 (14), 8335 (6), 8870 (14); Grijalva 3705 (6).

Haber 314 (13), 5064 (13), 5591 (13), 5665 (13), 5701 (13), 5826 (13), 5998 (13), 6643 (13), 7938 (13), 8198 (13), 9155 (13), 11267 (13); von Hagen 2022 (11), 2031 (11); von Hagen 2070 (11); Hammel 7013 (10), 8534 (5), 15679 (6), 16504 (6 vel aff.), 17836 (14), 18049 (13), 19217 (9), 20062 (6), 20553 (8); Hartshorn 1463 (13), **1530** (14), 2130 (13); Hawkins 452 (11), 588A (11), 647 (11), 712 (11); Hazlett 582 (11), 1341 (6), 2516 (11); Heath 594 (6), 2033 (6); Herrera 475 (13), 3778 (13), 4866 (6), 4946 (13), 4986 (14), 5144 (14), 8938 (7); House 975 (11), 1187 (11), 1300 (11).

Ishiki 1389 (11), 1396 (11), 1488 (11), 1551 (11).

Jimenez 564 (13), 827 (13); Johnson 578 (6); Juzepczuk 1513 (12).

Kirkbride 486 (14).

Laughlin 528 (6); **Lent 794** (7), 2070 (7); **Liebmann 770/3** (1), **770/22** (1), **771/2** (1), **771/23** (1); Liesner 1789 (6); **Linden 1641** (6); Lopez L. 181 (11); Lorea 5542 (6); Lorence 4711 (1); Lot 222 (6); Lundell 18944 (11), 19425 (6), 20435 (11), 20999 (11), 21170 (11).

MacDougall H288 (6); Martinez S. 17084 (3), 20768 (6); Matuda 1887 (6), 5020 (11), 5125 (6), 5352 (11), 5375 (11), 5400 (6), 5437 (11), 6095 (6), 16224 (6); Maya 1226 (6), 1316 (6), 2094 (6), 2865 (6), 2882 (6), 2989 (6), 3081 (6), 3098 (11), 3951 (6), 3967 (6), 4176 (11), 4232 (11), 4276 (6), 4292 (11); McPherson 9259 (13), **10421** (5), 10573 (5); Meave 1314 (6); Mejia 12 (11), 256 (11), 283 (11), 294 (11), 334 (11), 379 (11); Mendez G. 7966 (6), 8503 (3), 8888 (6), **8930** (3); Mendez Ton 4214 (2), 4802 (11), 5035 (12), 5068 (11), 5264 (12), 5902 (6), 5931 (11), 9594 (3); Miller 2653 (6), 2943 (6).

s.l.); Molina 203 (6), 8138 (6), 8186 (6), 11521 (6), 11769 (6), 12289 (6), 23320 (11), 24212 (11), 24289 (11), 31102 (6); Montenegro 1845 (6); Mora 110 (14), 416 (7), 508 (7); Moraga 171 (7); Morales 39 (13), 248 (13), 377 (6), 436 (10), 665 (6), 1053 (6), 4806 (10), 5812 (8), 5989 (8); Moreno 7477 (6), 8253 (6), 15427 (6), 15647 (6), 15826 (6), 15862 (6), 19376 (6), 19396B (6), 19424 (6), 21103 (6).

Nee 24906 (6), 29832 (aff. 2); Nelson 2419 (6).

Poveda 3920 (14).

Quesada 368 (6), 941 (7); Quintanilla 49 (3).

Ramirez 139 (6), 384 (6), 452 (6); Ramirez-Marcial 656 (6); Raven 19804 (6), 21630 (6); Rios 179 (7); Rivera 260 (10), 664 (6).

Sandino 2330 (6), 4706 (6); Santiz Ruiz 836 (6); **Schul-**
tes 827 (2); Shank 55 (6); **Shilom Ton 779** (6), **2014**
(12), 3645 (12), **3560** (6), 7399 (11); Sinaca 777 (aff. 2);

Soto 226 (6); Sousa 9337 (1); Stafford 316 (6); Standley 8044 (6), 20611 (6), 69379 (6), 69525 (6), 71446 (6), 89985 (6), 91546 (6); Stevens 17055 (6), 20397 (6), 22153 (6); Steyermark 44207 (6), 44280 (6), 44648 (6).

Taylor 4460 (10); Tenorio 3457 (12 vel aff.), 5870 (1), 11276 (1); Thorne 40325 (6); **Tonduz 11676** (8); Torres 476 (1), 494 (1), 1400 (6), 2066 (1), 2928 (1), 4832 (11), 4871 (11), 4953 (1), 4973 (1), 6598 (6), 8866 (6), 9153 (6), 10444 (6), 10830 (6), 11620 (6), 11911 (6); von Turckheim II 1651 (11), II 2164 (6).

Vazquez Torres 378 (2).

Wendt 2677 (aff. 2), 3000 (aff. 2), 3000A (aff. 2), 3861 (2), 4315 (6), 4653 (11), 4866 (11), 5137 (6), 5622 (2), **6765** (4); Wheelwright 209 (13); Williams 13888 (10), 15760 (6), 16469 (13), 20540 (6), 28623 (13), 28996 (13), 40390 (6); Wilson 40770 (6), 40859 (6).

Yncker 5777 (11).

Zamora 674 (14), 1287 (6); Zuniga 282 (6).